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Cardiokymography

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service

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FOREWORD

The Office of Health Technology Assessment (OHTA) evaluates the safety and effectiveness of new or unestablished medical technologies that are being considered for coverage under Medicare. These assessments are done at the request of DHHS' Health Care Financing Administration (HCFA), which uses them in support of medicare policy and decisionmaking.

Questions about Medicare coverage for certain health care technologies are directed to HCFA by such interested parties as insurers, manufacturers, Medicare contractors, and practitioners. Those of a medical, scientific, or technical nature are formally referred to OHTA for assessment.

OHTA's assessment activities include a comprenensive review of the medical literature and emphasize broad and open participation from within and outside the Federal Government. A range of expert advice is obtained by widely publicizing plans for input from Federal agencies, medical specialty societies, insurers, and manufacturers. The involvement of these experts helps assure the experience and varying viewpoints needed to round out the data derived from individual scientific studies and medical specialty analyses.

After OHTA receives information from experts and the scientific literature, the results are incorporated and synthesized into an assessment report. The Health Technology Assessment Reports form the basis for OHTA's communication to HCFA and are widely disseminated.

OHTA is part of the National Center for Health Services Research and Health Care Technology Assessment, Office of the Assistant Secretary for Health, Public Health Service, DHHS.

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Public Health Service Assessment

Cardiokymography

1985

INTRODUCTION

Cardiokymography (CKG) is a non-invasive test used to detect stress induced motion abnormalities of the anterior left ventricular wall of the heart. Its purpose is the diagnosis of coronary artery disease (CAD). This diagnostic modality is also known as "displacement cardiography."

CKG involves translation of heart wall motion into a variable electrical signal that is recorded in graphic form. It may be affected by chest wall motion, systolic rotation of the v ntricle, or patient movement. The transducer that detects heart wall motion is typically placed ventrally over the left thorax. The resulting tracing is a summation of movement in a specific focal area under the transducer.

BACKGROUND

The Office of Health Technology Assessment (OHTA) performed an assessment of CKG in 1983 (1). At that time, OHTA concluded that adequate scientific data were lacking with respect to the diagnostic effectiveness of CKG. Additional clinical trials were considered essential to clarify the utility of the device. Specifically, the potential for misinterpretation due to false abnormal wall motion recordings was noted.

On March 24, 1984, the Executive Committee of the American College of Cardiology adopted a policy statement that favored the clinical utility of CKG. They stated that: "In view of the data recently available demonstrating the relatively high specificity of exercise kymography, reasonable sensitivity, and low cost, it is the opinion

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of the American College of Cardiology that the test has been established as having a role in the diagnosis of coronary artery disease in conjunction with exercise testing." Upon the appearance of this statement, OHTA was requested by HCFA to conduct a reassessment of CKG to determine if new information had become available that would validate the efficacy of CKG for routine clinical practice.

RATIONALE

Proponents argue that CKG can be used for the purpose of improving diagnostic accuracy in the detection of CAD. They postulate that partial or total occlusion of the coronary arteries results in cardiac wall motion abnormalities, and that exercise induced wall motion abnormalities are sensitive and specific indicators of CAD. CKG is employed to detect such exercise induced anterior heart wall anomalies non-invasively. Its use for detection of posterior wall lesions is not well established.

REVIEW OF AVAILABLE INFORMATION

Since completion of OHTA's assessment of CKG, three publications of interest have appeared in the medical literature. Weiner, et al used CKG in 204 consecutive patients undergoing treadmill testing followed by coronary angiography (2). Bellows, et al performed a preliminary study to determine if CKG would detect heart wall abnormalities during anesthesia as compared to concurrent electrocardiographic evidence of ischemic heart disease (3). Burke, et al studied CKG in 179 patients with suspected CAD (4). Although the authors of these articles reported encouraging results with CKG, the three studies share certain methodological shortcomings with earlier publications on this topic. Because CKG positivity is weighted in favor of anterior ventricular wall disease,studies of previously diagnosed CAD patients are subject to selection bias. Well-

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designed investigations that avoid this source of possible bias are not available.

DISCUSSION

The utility of CKG in detecting CAD remains equivocal. Although a few additional published studies have appeared, an adequate scientific basis for comparison of CKG with other diagnostic modes is still lacking.

The American College of Cardiology has informed the OHTA that their March 24, 1984 statement on CKG has been reconsidered. On March 12, 1985 the College adopted the following position: "When compared with other methods of cardiac screening and diagnosis, Cardiokymography has appropriate rationale. However, it is the opinion of the American College of Cardiology that as yet there has been insufficient data to identify specific and unique applications of this technology and it should be considered investigational."

The American Medical Association has informed OHTA that its 1983 Diagnostic and Therapeutic Technology Assessment (DATTA) of CKG remains unchanged. Most respondents considered CKG to be investigational, some felt its place was indeterminate and a few thought it to be unacceptable in view of other non-invasive diagnostic techniques that provide much more information.

The National Institutes of Health has informed OHTA that CKG is potentially capable of providing diagnostic information about heart wall motion. However, both echocardiographic and radionuclide studies were felt to provide regional and global information of cardiac dysfunction which are more useful than local heart motion (mainly anterior wall) detected by CKG. Further evaluation of CKG was considered necessary to precisely define its role in relation to other techniques for assessment of cardiac dysfunction.

The Food and Drug Administration has informed OHTA that the original 1983

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assessment of CKG accurately reflects the current regulatory status of this diagnostic technique.

Notice of this reassessment appeared in the Federal Register of October 26, 1984;49(209):43111-43112.

SUMMARY

Reassessment of CKG has disclosed that adequate scientific data are lacking with respect to the diagnostic effectiveness of this technology. At the present time cardiokymography continues to be considered investigational, when used as a method of diagnosing ischemic heart disease.

REFERENCES

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16. Abstract (Limit: 200 words)

Cardiokymography (CKG) is a non-invasive test to detect stress induced motion abnormalities of the anterior left ventricular wall of the heart for coronary artery disease (CAD). CKG involves translation of heart wall motion into a variable electrical signal that is recorded in graphic form. It may be affected by chest wall motion, systolic rotation of the ventricle, or patient movement. The tracing is a summation of cardiothoracic movement in the area under the trancuducer. Proponents argue that CKG can be used for improving diagnostic accuracy in the detection of CAD. They postulate that occlusion of the coronary arteries results in cardiac wall motion abnormalities, and that exercise induced wall motion abnormalities are indicators of CAD. CKG is employed to detect such exercise induced anterior heart wall anomalies non-invasively. Its use for detection of posterior wall lesions is not well established. The utility of CKG in detecting CAD remains equivocal. Reassessment of CKG has disclosed that adequate scientific data are lacking with respect to the diagnostic effectiveness of this technology. At the present time cardiokymography continues to be considered investigational, when used as a method of diagnosing ischemic heart disease.

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